Software Product Description

PRODUCT NAME: DEC SQL, Version 6.0, for OpenVMS AXP   **SPD 52.92.00**

DESCRIPTION

DEC SQL for OpenVMS AXP (DEC SQL) provides a set of SQL92 compliant interfaces to DEC Rdb databases and the DEC DB Integrator family of products. Programming interfaces include interactive SQL, dynamic SQL, SQL module language and embedded SQL. The SQL/Services and SQL Multimedia APIs support the development of client applications for SQL/Services servers.

SQL Language Support

DEC SQL provides the application developer with a robust, SQL92 compliant implementation Data Definition Language (DDL) and Data Manipulation Language (DML).[1]

SQL Data Definition Language

SQL statements issued through the interactive SQL utility, the dynamic SQL interface, the SQL precompilers or SQL module language accomplish the following actions:

- Create databases, schemas, tables, views, columns, domains and indexes (both ascending and descending)

- Define constraints in table definitions

- Define triggers for table definitions

- Grant and revoke privileges to databases, schemas, tables and columns

- Alter definitions of tables, columns, storage areas, and access rights

- Delete definitions of tables, views, columns, indexes, constraints, triggers, storage areas, and access rights

- Restructure databases on line, without unloading and reloading the database

- Add comments to definitions of domains, tables, views, columns, and indexes

- Define collating sequences for international character sets

- Use multi-octet character sets for both data and identifiers

- Specify string length and offsets in terms of characters rather than octets

SQL Data Manipulation Language

DML statements issued through the interactive SQL utility, dynamic SQL interface, the SQL precompilers or SQL module language accomplish the following actions:

- Perform standard data manipulation operations: insert, select, update, and delete

- Perform standard relational operations: select, join, union, and project

- Perform date-time operations in SQL: cast, current_ date, current_time, current_timestamp, and extract

- Access multiple databases in the same program

- Perform atomic transactions completed by a COMMIT or ROLLBACK statement on a single database or across multiple databases and applications

- Reduce the number of exchanges between application programs and the database system through the use of multistatement procedures in SQL module language

- Direct SQL run-time errors to customized error handling routines

SQL Programming Interfaces

DEC SQL supports all standard SQL application programming interfaces including interactive SQL, embedded SQL, SQL module language, and dynamic SQL.

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[1] The listed SQL capabilities are dependent on supporting features in the underlying database management systems and gateways

Interactive SQL Environment

The DEC SQL Interactive license provides interactive, SQL-based access to compatible Digital database management systems and gateways. Support for this environment includes online help and a SQL SHOW facility to display information about the database and session and a command buffer that allows editing of previous SQL statements. All executable DEC SQL statements, excluding those specific to the other SQL interfaces, such as PREPARE and RELEASE statements, are available. This facility is used to create and maintain databases.

Dynamic SQL Programming

The dynamic SQL interface compiles and executes SQL requests passed through its call interface. This programming approach is highly effective in applications such as ad-hoc query where the exact parameters of requests are not known until runtime. It is compatible with all programming languages that support the OpenVMS calling standard. The dynamic memory handling capabilities of DEC Ada and DEC C enable applications written in these languages to take full advantage of the power and flexibility of this approach.

All compatible Digital database management systems and gateways include the dynamic SQL facility.

Embedded SQL Programming

The DEC SQL Development license includes SQL precompilers for DEC Ada, DEC C, DEC COBOL, DEC Fortran and DEC Pascal. These precompilers allow SQL language statements to be embedded directly in the host language program. Precompilers replace these SQL statements with call statements and create callable SQL module language objects. Once the modified host language program is compiled, it is linked with the object modules to form an executable image.

SQL Module Language Support

The DEC SQL Development license also includes an SQL module language processor. SQL module language allows SQL statements and multistatement procedures to be grouped into modules. SQL module language syntax includes SQL DML statements, SQL transaction control statements and flow-control statements. When SQL modules are compiled, the resulting objects can be linked with objects created by any language compiler that complies with the OpenVMS calling standard or be maintained in the database as a set of stored procedures.

Client applications invoke stored procedures through the SQL CALL statement. This approach reduces network traffic and affords a higher degree of modularity in client/server applications. Access to stored procedures is controlled through the use of Access Control Lists (ACLs).

SQL Language Exception Flagging

The DEC SQL precompilers and SQL module language compiler include a Federal Information Processing Standards (FIPS) flagger, allowing the user to identify any SQL statements that are not in the current ANSI/ISO SQL standard. DEC SQL also includes an exception flagger for the Multivendor Integration Architecture (MIA).

Data Dictionary Support

DEC SQL can maintain definitions of database objects such as attributes, fields and indexes in system defined tables in a data dictionary database. These definitions can be read or modified through the SQL DDL language interface.

Desktop Connectivity

The SQL/Services client Application Programming Interface (API) supports the development of desktop application clients that can read and update data in compatible Digital database and gateway servers.

Programming libraries are provided for MS® Windows™, MS–DOS®, OS/2®, Macintosh®, ULTRIX and OpenVMS client platforms. SQL/Services clients can connect to compatible Digital database and gateway servers over DECnet, TCP/IP or AppleTalk® network transports.

The following table summarizes SQL/Services network support.

Desktop	SQL/Services Network Support		
Client	DECnet	TCP/IP	AppleTalk
MS Windows	X	X	–
MS–DOS	X	X	–
OS/2	X	–	–
Macintosh	X	X	X
SPARCstation™	–	X	–
OpenVMS	X	X	–
ULTRIX	X	X	–

Microsoft® Open Database Connectivity (ODBC) applications can read from, and write to data sources served by the SQL/Services facility using the DEC ODBC Driver for MS Windows. This driver supports both the DECnet and TCP/IP network transports.

All compatible Digital database and gateway engines include the SQL/Services server and the DEC ODBC Driver for MS Windows.

SQL Multimedia Support

The DEC SQL Development license includes the SQL Multimedia software library. This library simplifies the development of distributed, client/server multimedia applications by providing the application developer with a callable interface supporting a set of functions that exchange multimedia objects between SQL/Services servers and client applications. Client application platforms include MS-Windows, MS–DOS, Macintosh, ULTRIX/RISC and OpenVMS platforms. Client applications are written in Microsoft C; Macintosh client applications can be written in either MPW™ C or ThinkC.

This software library allows the application programmer to define multimedia object classes including COMPOUND DOCUMENT, TEXT, TABLE, IMAGE, VOICE, VIDEO and BLOB and user-definable object formats. Image compression and decompression is available through DECimage Application Services.

Data Management Features

DEC SQL provides the developer with the capabilities to maximize concurrency while ensuring data integrity and enforcing established security rules. The features that contribute to concurrency, data integrity and security are:

Concurrency Controls

- Transaction syntax supports full concurrent access (storage, retrieval, update, and deletion) in a multi-user environment

- Support for optional read-only (snapshot) mode prevents read-only transactions from blocking other transactions

- Support for SERIALIZABLE, REPEATABLE READ or READ COMMITTED transaction isolation

Integrity Controls

- Validity checked at the column level

- Declarative referential integrity rules enforced at execution time

- Transparent Two Phase Commit protocol based on DECdtm Services

- Trigger enforced execution of one or more actions when predefined database conditions are met

Security

- Access Control Lists (ACLs) determine users' rights to perform specific database operations on specific database entities. The database owner controls the assignment of rights to users.

- Access Control Lists govern access to:
  - — Tables
  - — Views
  - — Data definitions
  - — Data manipulation operations
  - — Database utility operations
- Logging facility to log all database access requests

Remote Database Access

DEC SQL applications are able to read from and write to compatible Digital databases and gateways within a common network.

The SQL/Services and SQL Multimedia APIs provide desktop clients with remote access to compatible Digital database and gateway servers on OpenVMS nodes via DECnet or TCP/IP network transports.

Other Parameters

Datatype Support

DEC SQL supports the following datatypes:

- ASCII text (1 to 16,383 bytes)

- Varying string (1 to 16,383 bytes)

- Date

- Signed byte (8-bit)

- Signed word (16-bit) integer

- Signed longword (32-bit) integer

- Signed quadword (64-bit) integer

- Single precision floating point (F_floating)

- Double precision floating point (G_floating)

- List cursors (segmented strings) for storing large amounts of unstructured data, such as documents, voice, graphics or Binary Large OBjects

Distributed Database Features

Distributed Unit of Work support, based on Digital's Two-Phased Commit protocol, DECdtm, allows updates to multiple, distributed databases to be synchronized within a single transaction.

Application Portability

DEC SQL application programming may be ported from the OpenVMS VAX to OpenVMS AXP by recompiling and re-linking the programs using DEC SQL for OpenVMS AXP and the OpenVMS AXP implementation of the appropriate language compiler(s). Differences in the 3GL compiler version or implementation may make minor changes to the source code necessary. This approach assumes that the source code is available and an equivalent 3GL compiler is available for use on the OpenVMS AXP Operating System.

For DEC SQL applications where the source code or the required compiler is not available and the application is based on DEC Rdb Version 4.0 or later, the OpenVMS VAX executable images may be directly translated to OpenVMS AXP executable images by the DECmigrate for OpenVMS AXP product. Although this approach will successfully port most OpenVMS VAX applications to OpenVMS AXP, the translation of all images is not guaranteed.

CONFORMANCE TO STANDARDS

DEC SQL complies with the following standards:

- American National Standard Database Language SQL, ANSI X3.135-1992, Entry SQL level

- Federal Information Processing Standard for Database Language SQL (FIPS SQL) as defined in FIPS PUB 127-2

- ISO/IEC 9075:1992, Database Language SQL, Entry SQL level

DEC SQL supports the Multivendor Integration Architecture (MIA). This support includes the use of multibyte character sets in database objects, literals and parameters; the ability to specify the lengths and offsets of database objects in terms of characters rather than bytes; the use of more than one character set in a database; and support for the Kanji character set in accordance with JIS X0208-1983.

HARDWARE REQUIREMENTS

Processors Supported

AXP: DEC 2000 Model 300 AXP,
                DEC 2000 Model 500 AXP

DEC 3000 Model 300 AXP,
DEC 3000 Model 300L AXP,
DEC 3000 Model 300X AXP,
DEC 3000 Model 300XL AXP,
DEC 3000 Model 400 AXP,
DEC 3000 Model 400S AXP,
DEC 3000 Model 500 AXP,
DEC 3000 Model 500S AXP,
DEC 3000 Model 500X AXP,
DEC 3000 Model 600 AXP,
DEC 3000 Model 600S AXP,
DEC 3000 Model 800 AXP,
DEC 3000 Model 800S AXP

DEC 4000 Model 610 AXP,
DEC 4000 Model 710 AXP

DEC 7000 Model 610 AXP

DEC 10000 Model 610 AXP

OPTIONAL HARDWARE

For SQL/Services desktop clients on MS Windows, MS–DOS or OS/2 or SQL Multimedia clients:

- Personal Computer XT, Personal Computer AT®, or equivalent

- Ethernet LAN connectivity

For SQL/Services Macintosh platform:

- Macintosh Plus, Macintosh SE and SE/30, Macintosh II, IIx, IIcx, IIci, and IIfx, Macintosh portable

- Ethernet LAN connectivity

For Sun® platform:

- SPARCstation™ 1

- Ethernet LAN connectivity

CLUSTER ENVIRONMENT

This product is fully supported when installed on any valid and licensed VMScluster configuration without restrictions. These configurations are described in the VMScluster Software Product Description (SPD 42.18.xx) and include CI, Ethernet, and Mixed Interconnect configurations.

SOFTWARE REQUIREMENTS

Server Platform

- DEC OpenVMS AXP Operating System, V6.1

- A Relational Database Manager or Gateway, one of the following:

  — DEC Rdb for OpenVMS AXP, V6.0

  — DEC DB Integrator for OpenVMS AXP, V1.0

— DEC DB Integrator Gateway for SYBASE® for OpenVMS AXP, V1.0

— DEC DB Integrator Gateway for RMS for OpenVMS AXP, V3.0

— DEC DB Integrator Gateway for ORACLE® for OpenVMS AXP, V3.0

— DEC DB Integrator Gateway for DBMS for OpenVMS AXP, V1.0

— DEC DB Integrator Gateway for Custom Drivers for OpenVMS AXP, V3.0

— DEC DB Integrator Gateway for DB2 client for OpenVMS AXP, V3.0

- DEC C, Version 4.0 for OpenVMS AXP Systems is required to develop SQL Multimedia applications on the server

- SQL/Services client applications communicating via TCP/IP require DEC TCP/IP Services for OpenVMS AXP V3.0 on the host system

Client Platforms

*SQL/Services MS Windows client
(DECnet or TCP/IP):*

- MS–DOS Operating System, V5.0 - V6.2

- MS Windows, V3.0 - V3.1

- One of the following network products:

— PATHWORKS for DOS, V4.1A

— PATHWORKS for DOS (TCP/IP), V2.0

— PATHWORKS V5 for DOS and Windows client software

— FTP® PC/TCP V2.2[2]

*SQL Multimedia MS Windows client
(DECnet or TCP/IP):*

- MS–DOS Operating System, V5.0 - V6.2

- MS Windows, V3.1

- One of the following network products:

— PATHWORKS for DOS, V4.1A

— PATHWORKS V5 for DOS and Windows client software

- Microsoft C, V7.0, Microsoft Visual C++

SQL/Services MS–DOS client (DECnet, or TCP/IP):

- MS–DOS Operating System, V5.0 - V6.2

- One of the following network products:

— PATHWORKS for DOS, V4.1A

— PATHWORKS for DOS (TCP/IP), V2.0

- Microsoft C, V7.0, Microsoft Visual C++

SQL Multimedia MS–DOS client (DECnet, or TCP/IP):

- MS–DOS Operating System, V5.0 - V6.2

- One of the following network products:

— PATHWORKS for DOS, V4.1A

- Microsoft C, V7.0, Microsoft Visual C++

SQL/Services OS/2 client (DECnet only):

- OS/2 Operating System, V1.3

- PATHWORKS for OS/2, V1.1 - V2.0B

- Microsoft C, V6.0, V7.0

*SQL/Services Macintosh System 6.0.8 MPW client
(DECnet, AppleTalk, or TCP/IP):*

- Macintosh Operating System V6.0.8

- PATHWORKS for Macintosh, V1.2

- AppleShare® Workstation Software for System V6.0.8
  (Required for PATHWORKS installation)

- MPW Development Environment, Version 3.2.3, and MPW, Version 3.2.3, C compiler
  (Required for application development only)

*SQL/Services Macintosh System 7 MPW client
(DECnet, AppleTalk, or TCP/IP):*

- Macintosh Operating System, V7, V7.1

- PATHWORKS for Macintosh, V1.2

- AppleShare Workstation Software for System 7.1
  (required for PATHWORKS installation)

- MPW Development Environment, Version 3.3.1, and MPW, Version 3.3.1, C compiler
  (Required for application development only)

*SQL Multimedia Macintosh System 7 MPW client
(DECnet, AppleTalk, or TCP/IP):*

- Macintosh Operating System, V7

- PATHWORKS for Macintosh, V1.2

- AppleShare Workstation Software for System 7.1
  (required for PATHWORKS installation)

- One of the following programming environments is required to support application development

— MPW Development Environment, Version 3.3.1, and MPW, Version 3.3.1, C compiler

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[2] In addition, the SQL/Services MS Windows clients are compliant with the Windows Sockets V1.1 specification. However, the only Windows Sockets compliant transport that has been fully tested is FTP PC/TCP V2.2

— Symantec® THINK C, V6.0.1, and THINK C, V6.0.1, C Compiler for the Macintosh system

SQL/Services Macintosh System 6.0.8 THINK C client (DECnet, AppleTalk, or TCP/IP):

- Macintosh Operating System, V6.0.8

- PATHWORKS for Macintosh, V1.2

- AppleShare Workstation Software for System, V6.0.8 (Required for PATHWORKS installation)

- Symantec THINK C, V6.0.1, and THINK C, V6.0.1, C Compiler for the Macintosh system (Required for application development only)

SQL/Services Macintosh System 7 ThinkC client (DECnet, AppleTalk, or TCP/IP):

- Macintosh Operating System, V7, V7.1

- PATHWORKS for Macintosh, V1.2

- AppleShare Workstation Software for System 7.1 (Required for PATHWORKS installation)

- Symantec THINK C, V6.0.1, and THINK C, V6.0.1, C Compiler for the Macintosh system (required for application development only)

SQL Multimedia OpenVMS client (DECnet only):

- OpenVMS VAX Operating System, V5.5 or OpenVMS AXP Operating System, V1.5

SQL/Services or SQL Multimedia ULTRIX client (DECnet or TCP/IP):

- ULTRIX Operating System, V4.1 - V4.3

- PATHWORKS for ULTRIX, V2.2 (Required for DECnet applications only)

SQL/Services Sun client (TCP/IP only):

- Sun Operating System, V4.1.1

OPTIONAL SOFTWARE

Certain versions of these products depend upon a specific version of the operating system. Please see the Software Product Description (SPD) of the product in question to determine which version you need.

- CDD/Repository for OpenVMS AXP Systems, V5.2

- DEC SQL provides precompiler support for the following language compilers:

  — DEC Ada for OpenVMS AXP Systems, V3.0A

  — DEC Fortran for OpenVMS AXP Systems, V6.1

  — DEC C for OpenVMS AXP Systems, V1.3

  — DEC COBOL for OpenVMS AXP Systems, V1.0

  — DEC Pascal for OpenVMS AXP Systems, V5.1

- DEC SQL applications can access data via the following Digital database servers and gateways:

  — DEC Rdb for OpenVMS AXP, V6.0

  — DEC Rdb for OpenVMS VAX, V6.0

  — DEC DB Integrator for OpenVMS AXP, V1.0

  — DEC DB Integrator for OpenVMS VAX, V1.0A

  — DEC DB Integrator Gateway for SYBASE for OpenVMS AXP, V1.0

  — DEC DB Integrator Gateway for SYBASE for OpenVMS VAX, V1.0A

  — DEC DB Integrator Gateway for RMS for OpenVMS AXP, V3.0

  — DEC DB Integrator Gateway for RMS for OpenVMS VAX, V3.0A

  — DEC DB Integrator Gateway for ORACLE for OpenVMS AXP, V3.0

  — DEC DB Integrator Gateway for ORACLE for OpenVMS VAX, V3.0

  — DEC DB Integrator Gateway for DSM for OpenVMS, V1.0

  — DEC DB Integrator Gateway for Custom Drivers for OpenVMS AXP, V3.0

  — DEC DB Integrator Gateway for Custom Drivers for OpenVMS VAX, V3.0A

  — DEC DB Integrator Gateway for DB2 Client for OpenVMS AXP, V3.0

GROWTH CONSIDERATIONS

The minimum hardware and software requirements for any future version of this product may be different from the requirements for the current version.

DISTRIBUTION MEDIA

DEC SQL software media and documentation are included as part of the media and documentation kits of compatible Digital database and gateway servers.

ORDERING INFORMATION

DEC SQL Development

Traditional Software License: QL-2PVA9-AA
Concurrent Use Software License: QL-2PWAA-3B
Software Product Services: QT-2PVA*-**

DEC SQL Interactive

Traditional Software Licenses: QL-2PUA9-AA
Concurrent Use Software License: QL-2PTAA-3B
Software Product Services: QT-2PUA*-**

* Denotes variant fields. For additional information on available licenses, services, and media, refer to the appropriate price book.

The above information is valid at time of release. Please contact your local Digital Office for the most up-to-date information.

SOFTWARE LICENSING

This software is only furnished under a license. For more information about Digital licensing terms and policies, contact your local Digital office.

License Management Facility Support

This layered product supports the OpenVMS License Management Facility. Traditional and Concurrent Use licenses are available for both the Development and Interactive options.

The Traditional license permits unlimited use of this software product on a single, identified processor. Each Concurrent Use License allows any one user at a time to use the layered product. For this software product a user is defined as an OpenVMS process serving either an individual or another local or remote process.

For more information on the License Management Facility, refer to the OpenVMS AXP Operating System Software Product Description (SPD 41.87.xx) or the OpenVMS Operating System documentation set.

Product-Specific Licensing Information

DEC SQL Development License

The DEC SQL Development Option includes language precompilers for DEC Ada, DEC C, DEC COBOL and DEC Fortran and DEC Pascal, the SQL module language compiler, SQL/Services client API libraries, SQL Multimedia client API libraries.

The Development license supports development of host based and client/server applications.

DEC SQL Interactive License

The DEC SQL Interactive license includes complete interactive SQL database definition and manipulation facilities.

This license provides the ability to define databases and database entities with the interactive SQL facility. This license is not intended to support program development.

DEC SQL Run-Time License

The DEC SQL Run-Time facilities are provided by each compatible Digital database or gateway server license. These facilities include the dynamic SQL engine, SQL/Services server process, a subset of interactive SQL and the DEC ODBC Driver for MS Windows.

These facilities support the execution of previously developed applications on a target machines. They do not support interactive data definition and application program development.

Client Software Licensing

A site-wide right to use SQL/Services client software is included with each Traditional or Personal Use Full Development Option.

Parties selling or distributing a software product that incorporates Digital Equipment Corporation's SQL/Services client application programming interface, may copy and distribute the SQL/Services client runtime libraries with that software product.

The following chart summarizes the software components contained in each license option.

	Run-Time	Inter-active	Devel-opment
Base database software	X	–	–
Dynamic SQL engine	X	–	–
SQL/Services Server	X	–	–
RMU	X	–	–
DEC ODBC Driver	X	–	–
Interactive SQL Utility	X[3]	X	–
SQL Module Language Compiler	–	–	X
SQL Precompilers	–	–	X
SQL/Services Client APIs	–	–	X
SQL Multimedia library	–	–	X

SOFTWARE PRODUCT SERVICES

A variety of service options are available from Digital. For more information, contact your local Digital office.

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[3] A subset interactive SQL commands (data manipulation only) is available with the Run-Time facilities

SOFTWARE WARRANTY

Warranty for this software product is provided by Digital with the purchase of a license for the product as defined in the Software Warranty Addendum of this SPD.

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